Models

HP HSR6602-G Router	JG353A
HP HSR6602-XG Router	JG354A

Key features

- High-performance WAN routing
- Compact, multi-core centralized processing architecture
- Comprehensive routing, switching, and security
- Modular WAN and LAN connectivity options
- Robust high availability and resiliency

Product overview

The HP HSR6600 Router Series is made up of high-performance services WAN routers that are ideal for small- to medium-sized campus WAN edge and aggregation, as well as high-end branch deployments.

These routers are built with a compact multi-core centralized processing architecture that delivers, in a 2 RU form factor, robust routing, security, full Layer 2 switching, and modular WAN and LAN interface options, all integrated in a single fast and powerful routing platform.

In addition, these routers feature robust carrier-class reliability capabilities to reduce disruption from network or system failures.

Features and benefits

Connectivity

- **Multiple WAN interfaces**
  support Fast Ethernet/Gigabit Ethernet/10GbE ports, OC3~OC48 POS/CPOS, and ATM ports
- **Flexible port selection**
  provides a combination of fiber/copper interface modules, 100/1000BASE-X auto-speed selection, and 10/100/1000BASE-T auto-speed detection plus auto duplex and MDI/MDI-X; is speed adaptable between 155 M POS/622 M POS/Gigabit Eth
- **Loopback**
  supports internal loopback testing for maintenance purposes and an increase in availability; loopback detection protects against incorrect cabling or network configurations and can be enabled on a per-port or per-VLAN basis for added flexibility

Performance

- **High-performance platform**
  provides up to 15 Mpps forwarding performance

Resiliency and high availability

- **Separate data and control planes**
  provide greater flexibility and enable continual services
- **Hot-swappable modules**
  facilitates the replacement of hardware interface modules without impacting the traffic flow through the system

Overview

- **Optional redundant power supply**
  provides uninterrupted power; allows hot-swapping of one of the two supplies when installed
- **Virtual Router Redundancy Protocol (VRRP)**
  allows groups of two routers to dynamically back each other up to create highly available routed environments
- **Graceful restart**
  supports graceful restart for OSPF, IS-IS, BGP, LDP, and RSVP; the network remains stable during the active-standby switchover; after the switchover, the device quickly learns the network routes by communicating with adjacent routers; forwarding remains uninterrupted during the switchover to achieve nonstop forwarding (NSF)
- **Hitless software upgrades**
  allow patches to be installed without restarting the device, increasing network uptime and simplifying maintenance
- **IP Fast Reroute Framework (FRR)**
  nodes are configured with backup ports and routes; local implementation requires no cooperation of adjacent devices, simplifying the deployment; solves the traditional convergence faults in IP forwarding; achieves restoration within 50 ms, with the restoration time independent of the number of routes and fast link switchovers without route convergence

Product architecture

- **Multi-core CPU**
  delivers multi-threaded processing, with eight cores and 32 hardware threads
- **Distributed processing**
  two kinds of engines are hardware separated: main controller engine (routing engine) and service engines (Flexible Interface Platform [FIP]); the main controller engine is used for route computing and system management, and service engines are used for processing services

Layer 3 routing

- **Static IPv4 routing**
  provides simple manually configured IPv4 routing
- **Routing Information Protocol (RIP)**
  uses a distance vector algorithm with UDP packets for route determination; supports RIPv1 and RIPv2 routing; includes loop protection
- **Open shortest path first (OSPF)**
  delivers faster convergence; uses this link-state routing Interior Gateway Protocol (IGP), which supports ECMP, NSSA, and MD5 authentication for increased security and graceful restart for faster failure recovery
- **Border Gateway Protocol 4 (BGP-4)**
  delivers an implementation of the Exterior Gateway Protocol (EGP) utilizing path vectors; uses TCP for enhanced reliability for the route discovery process; reduces bandwidth consumption by advertising only incremental updates; supports extensive policies for increased flexibility; scales to very large networks
- **Intermediate system to intermediate system (IS-IS)**
  uses a path vector Interior Gateway Protocol (IGP), which is defined by the ISO organization for IS-IS routing and extended by IETF RFC 1195 to operate in both TCP/IP and the OSI reference model (Integrated IS-IS)
- **Static IPv6 routing**
  provides simple manually configured IPv6 routing
- **Dual IP stack**
  maintains separate stacks for IPv4 and IPv6 to ease the transition from an IPv4-only network to an IPv6-only network design
- **Routing Information Protocol next generation (RIPng)**
  extends RIPv2 to support IPv6 addressing
- **OSPFv3**
  provides OSPF support for IPv6
- **BGP+**

Overview

extends BGP-4 to support Multiprotocol BGP (MBGP), including support for IPv6 addressing

- **IS-IS for IPv6**

extends IS-IS to support IPv6 addressing

- **IPv6 tunneling**

allows IPv6 packets to traverse IPv4-only networks by encapsulating the IPv6 packet into a standard IPv4 packet; supports manually configured, 6to4, and Intra-Site Automatic Tunnel Addressing Protocol (ISATAP) tunnels; is an important element for the transition from IPv4 to IPv6

- **Multiprotocol Label Switching (MPLS)**

uses BGP to advertise routes across Label Switched Paths (LSPs), but uses simple labels to forward packets from any Layer 2 or Layer 3 protocol, which reduces complexity and increases performance; supports graceful restart for reduced failure impact; supports LSP tunneling and multilevel stacks

- **Multiprotocol Label Switching (MPLS) Layer 3 VPN**

allows Layer 3 VPNs across a provider network; uses MP-BGP to establish private routes for increased security; supports RFC 2547bis multiple autonomous system VPNs for added flexibility

- **Multiprotocol Label Switching (MPLS) Layer 2 VPN**

establishes simple Layer 2 point-to-point VPNs across a provider network using only MPLS Label Distribution Protocol (LDP); requires no routing and therefore decreases complexity, increases performance, and allows VPNs of non-routable protocols; uses no routing information for increased security; supports Circuit Cross Connect (CCC), Static Virtual Circuits (SVCs), Martini draft, and Kompella-draft technologies

- **Policy routing**

allows custom filters for increased performance and security; supports ACLs, IP prefix, AS paths, community lists, and aggregate policies

- **Multicast VPN**

supports Multicast Domain (MD) multicast VPN, which can be distributed on separate service cards, providing high performance and flexible configuration

- **Virtual Private LAN Service (VPLS)**

establishes point-to-multipoint Layer 2 VPNs across a provider network

- **Bidirectional Forwarding Detection (BFD)**

enables link connectivity monitoring and reduces network convergence time for RIP, OSPF, BGP, IS-IS, VRRP, MPLS, and IRF

- **IGMPv1, v2, and v3**

allow individual hosts to be registered on a particular VLAN

- **PIM-SSM, PIM-DM, and PIM-SM (for IPv4 and IPv6)**

support IP Multicast address management and inhibition of DoS attacks

- **Equal-Cost Multipath (ECMP)**

enables multiple equal-cost links in a routing environment to increase link redundancy and scale bandwidth

- **OSPFv3 MCE**

Multi-VPN-Instance CE (MCE) binds different VPNs to different interfaces on one single CE; the OSPFv3 MCE feature creates and maintains separate OSPFv3 routing tables for each IPv6 VPN to isolate VPN services in the device

Layer 3 services

- **Address Resolution Protocol (ARP)**

determines the MAC address of another IP host in the same subnet; supports static ARPs; gratuitous ARP allows detection of duplicate IP addresses; proxy ARP allows normal ARP operation between subnets or when subnets are separated by a Layer 2 network

- **User Datagram Protocol (UDP) helper**

redirects UDP broadcasts to specific IP subnets to prevent server spoofing

- **Domain Name System (DNS)**

provides a distributed database that translates domain names and IP addresses, which simplifies network design; supports client and server

Overview

- **Dynamic Host Configuration Protocol (DHCP)**
  simplifies the management of large IP networks

Security

- **Dynamic Virtual Private Network (DVPN)**
  collects, maintains, and distributes dynamic public addresses through the VPN Address Management (VAM) protocol, making VPN establishment available between enterprise branches that use dynamic addresses to access the public network; compared to traditional VPN technologies, DVPN technology is more flexible and has richer features, such as NAT traversal of DVPN packets, AAA identity authentication, IPSec protection of data packets, and multiple VPN domains
- **Group Domain Virtual Private Network (GDVPN)**
  a tunnel-less VPN technology that allows for native end-to-end security for a full meshed network; suitable for an enterprise running encryption over a private Multiprotocol Label Switching (MPLS)/IP-based core network, as well as to encrypt multicast traffic
- **Stateful VPN Firewall**
  provides enhanced stateful packet inspection and filtering; supports flexible security zones and virtual firewall containment; provides advanced VPN services with Triple DES (3DES) and Advanced Encryption Standard (AES) encryption at high performance and low latency, Web content filtering, and application prioritization and enhancement
- **Access control list (ACL)**
  supports powerful ACLs for both IPv4 and IPv6; ACLs are used for filtering traffic to prevent unauthorized users from accessing the network, or for controlling network traffic to save resources; rules can either deny or permit traffic to be forwarded; rules can be based on a Layer 2 header or a Layer 3 protocol header; rules can be set to operate on specific dates or times
- **Unicast Reverse Path Forwarding (URPF)**
  allows normal packets to be forwarded correctly, but discards the attaching packet due to lack of reverse path route or incorrect inbound interface; prevents source spoofing and distributed attacks; supports distributed UFPF
- **Secure shell (SSHv2)**
  uses external servers to securely log in to a remote device; with authentication and encryption, it protects against IP spoofing and plain-text password interception; increases the security of Secure FTP (SFTP) transfers
- **Remote Authentication Dial-In User Service (RADIUS)**
  eases switch security access administration by using a password authentication server
- **Terminal Access Controller Access-Control System (TACACS+)**
  delivers an authentication tool using TCP with encryption of the full authentication request, providing additional security
- **Network address translation (NAT)**
  supports repeated multiplexing of a port and automatic 5-tuple collision detection, enabling NAPT to support unlimited connections; supports blacklist in NAT/NAPT/internal server, a limit on the number of connections, session log, and multi-instance

Quality of Service (QoS)

- **HQoS / Nested QoS**
  allows for precise and flexible traffic classification and scheduling
- **Traffic policing**
  supports Committed Access Rate (CAR) and line rate
- **Congestion management**
  supports FIFO, PQ, CQ, WFQ, CBQ, and RTPQ
- **Weighted random early detection (WRED)/random early detection (RED)**
  delivers congestion avoidance capabilities through the use of queue management algorithms
- **Other QoS technologies**
  support traffic shaping, FR QoS, MPLS QoS, and MP QoS/LFI

Management

Overview

- **Industry-standard CLI with a hierarchical structure**
  reduces training time and expenses, and increases productivity in multivendor installations
- **SNMPv1, v2, and v3**
  provide complete support of SNMP; provide full support of industry-standard Management Information Base (MIB) plus private extensions; SNMPv3 supports increased security using encryption
- **Management interface control**
  enables or disables each of the following interfaces depending on security preferences: console port, telnet port, or reset button
- **Remote monitoring (RMON)**
  uses standard SNMP to monitor essential network functions; supports events, alarm, history, and statistics group plus a private alarm extension group
- **Management security**
  restricts access to critical configuration commands; offers multiple privilege levels with password protection; ACLs provide telnet and SNMP access; local and remote syslog capabilities allow logging of all access
- **FTP, TFTP, and SFTP support**
  offers different mechanisms for configuration updates; FTP allows bidirectional transfers over a TCP/IP network; trivial FTP (TFTP) is a simpler method using User Datagram Protocol (UDP); Secure File Transfer Protocol (SFTP) runs over an SSH tunnel to provide additional security
- **Debug and sampler utility**
  supports ping and traceroute for both IPv4 and IPv6
- **Network Quality Analyzer (NQA)**
  analyzes network performance and service quality by sending test packets, and provides network performance and service quality parameters such as jitter, TCP, or FTP connection delays and file transfer rates; allows a network manager to determine overall network performance and to diagnose and locate network congestion points or failures
- **Network Time Protocol (NTP)**
  synchronizes timekeeping among distributed time servers and clients; keeps timekeeping consistent among all clock-dependent devices within the network so that the devices can provide diverse applications based on the consistent time
- **Information center**
  provides a central repository for system and network information; aggregates all logs, traps, and debugging information generated by the system and maintains them in order of severity; outputs the network information to multiple channels based on user-defined rules

Multicast support

- **Internet Group Management Protocol (IGMP)**
  utilizes Any-Source Multicast (ASM) or Source-Specific Multicast (SSM) to manage IPv4 multicast networks; supports IGMPv1, v2, and v3
- **Protocol Independent Multicast (PIM)**
  defines modes of Internet IPv4 and IPv6 multicasting to allow one-to-many and many-to-many transmission of information; PIM Dense Mode (DM), Sparse Mode (SM), and Source-Specific Mode (SSM) are supported
- **Multicast Source Discovery Protocol (MSDP)**
  allows multiple PIM-SM domains to interoperate; is used for inter-domain multicast applications
- **Multicast Border Gateway Protocol (MBGP)**
  allows multicast traffic to be forwarded across BGP networks separately from unicast traffic

Additional information

- **Green initiative support**
  provides support for RoHS and WEEE regulations

Warranty and support

Overview

- **1-year warranty**
  advance hardware replacement with 10-calendar-day delivery (available in most countries)
- **Electronic and telephone support**
  limited electronic and business-hours telephone support is available from HP for the entire warranty period; to reach our support centers, refer to **www.hp.com/networking/contact-support**; for details on the duration of support provided with your product purchase, refer to **www.hp.com/networking/warrantysummary**
- **Software releases**
  to find software for your product, refer to **www.hp.com/networking/support**; for details on the software releases available with your product purchase, refer to **www.hp.com/networking/warrantysummary**

Technical Specifications

HP HSR6602-G Router (JG353A)

I/O ports and slots	4 dual-personality 1000 Mbps ports (IEEE 802.3ab Type 1000BASE-T)	
	2 RJ-45 serial console ports	
	1 USB 2.0	
	1 RJ-45 out-of-band management port	
	1 Compact Flash port	
	1 open module slot; for either a FIP10 or FIP20 Module	
Physical characteristics	**Dimensions**	17.32(w) x 18.9(d) x 3.46(h) in (44 x 48 x 8.8 cm) (2U height)
	Weight	26.68 lb (12.1 kg), Fully loaded Chassis and power supplies as shipped
Memory and processor	**Processor**	Multi-core PowerPC @ 1500 MHz, 8 MB flash, 2 GB SDRAM, 512 MB compact flash
Mounting	EIA standard 19 in. rack	
Performance	**IPv6 Ready Certified**	
	Latency	13.5 μs (FIFO 64-byte packets)
	Throughput	up to 9 million pps (64-byte packets)
	Switch fabric speed	80 Gb/s
	Routing table size	1000000 entries (IPv4), 1000000 entries (IPv6)
	Forwarding table size	1000000 entries (IPv4), 1000000 entries (IPv6)
	Backplane bandwidth	80 Gb/s
Environment	**Operating temperature**	32ºF to 113ºF (0ºC to 45ºC)
	Operating relative humidity	5% to 95%, noncondensing
	Altitude	up to 13,123 ft (4 km)
Electrical characteristics	**Frequency**	50/60 Hz
	Maximum heat dissipation	505 BTU/hr (532.78 kJ/hr)
	AC Voltage	100-240 VAC
	Maximum power rating	300 W
	Notes	Maximum power rating and maximum heat dissipation are the worst-case theoretical maximum numbers provided for planning the infrastructure with fully loaded PoE (if equipped), 100% traffic, all ports plugged in, and all modules populated.
Safety	UL 1950; UL 60950; CAN/CSA 22.2 No. 60950; EN 60825; AS/NZS 60950; KN 60950; GOST R MEK60950; IEC 60950; EN 60950; IEC 60825; ROHS Compliance	
Emissions	VCCI Class A; EN 55022 Class A; CISPR 22 Class A; ICES-003 Class A; AS/NZS CISPR 22 Class A; CSA 2.22 60950; EN 61000-3-2; EN 61000-3-3; UL 60950; EN 60950-1; IEC 60950-1; FCC (CFR 47, Part 15) Subpart B Class A; ETSI EN 300 386 Class A; KN22 Class A; GB 9254 Class A; AS/NZS 60950-1	
Immunity	**Generic**	ETSI EN 300 386 V1.3.3; KN24
	EN	EN 55024, CISPR 24
Management	command-line interface; out-of-band management; SNMP Manager; Telnet; RMON1; terminal interface (serial RS-232C); Ethernet Interface MIB	

Technical Specifications

Services	Refer to the HP website at **www.hp.com/networking/services** for details on the service-level descriptions and product numbers. For details about services and response times in your area, please contact your local HP sales office.

HP HSR6602-XG Router (JG354A)

I/O ports and slots		4 dual-personality 1000 Mbps ports (IEEE 802.3ab Type 1000BASE-T) 2 SFP+ 10GbE ports (IEEE 802.3ae Type 10GBASE-SR) 2 RJ-45 serial console ports 1 USB 2.0 1 RJ-45 out-of-band management port 1 Compact Flash port 1 open module slot; for either a FIP10 or FIP20 Module
Physical characteristics	**Dimensions**	17.32(w) x 18.9(d) x 3.46(h) in (44 x 48 x 8.8 cm) (2U height)
	Weight	26.68 lb (12.1 kg) shipping weight Chassis and power supplies as shipped
Memory and processor	**Processor**	Multi-core PowerPC @ 1500 MHz, 8 MB flash, 4 GB SDRAM, 512 MB compact flash
Mounting		EIA standard 19 in. rack
Performance	**IPv6 Ready Certified**	
	Latency	13.5 µs (FIFO 64-byte packets)
	Throughput	up to 15 million pps (64-byte packets)
	Switch fabric speed	80 Gb/s
	Routing table size	4000000 entries (IPv4), 2000000 entries (IPv6)
	Forwarding table size	1000000 entries (IPv4), 1000000 entries (IPv6)
	Backplane bandwidth	80 Gb/s
Environment	**Operating temperature**	32ºF to 113ºF (0ºC to 45ºC)
	Operating relative humidity	5% to 95%, noncondensing
	Altitude	up to 13,123 ft (4 km)
Electrical characteristics	**Frequency**	50/60 Hz
	Maximum heat dissipation	512 BTU/hr (540.16 kJ/hr)
	AC Voltage	100-240 VAC
	Maximum power rating	300 W
	Notes	Maximum power rating and maximum heat dissipation are the worst-case theoretical maximum numbers provided for planning the infrastructure with fully loaded PoE (if equipped), 100% traffic, all ports plugged in, and all modules populated.
Safety		UL 60950; CAN/CSA 22.2 No. 60950; EN 60825; AS/NZS 60950; GOST R MEK60950; IEC 60950; EN 60950; IEC 60825; ROHS Compliance
Emissions		VCCI Class A; EN 55022 Class A; CISPR 22 Class A; ICES-003 Class A; AS/NZS CISPR 22 Class A; CSA 2.22 60950; EN 61000-3-2; EN 61000-3-3; UL 60950; EN 60950-1; IEC 60950-1; FCC (CFR 47, Part 15) Subpart B Class A; ETSI EN 300 386 Class A; KN22 Class A; GB 9254 Class A; AS/NZS 60950-1
Immunity	**Generic**	ETSI EN 300 386 V1.3.3; KN24

Technical Specifications

	EN	EN 55024, CISPR 24
Management	command-line interface; out-of-band management; SNMP Manager; Telnet; RMON1; terminal interface (serial RS-232C); Ethernet Interface MIB	
Services	Refer to the HP website at **www.hp.com/networking/services** for details on the service-level descriptions and product numbers. For details about services and response times in your area, please contact your local HP sales office.	

Standards and protocols
(applies to all products in series)

BGP

RFC 1657 Definitions of Managed Objects for BGPv4
RFC 1772 Application of the BGP
RFC 1773 Experience with the BGP-4 Protocol
RFC 1774 BGP-4 Protocol Analysis
RFC 1965 BGP-4 confederations
RFC 1966 BGP Route Reflection An alternative to full mesh IBGP
RFC 1997 BGP Communities Attribute
RFC 1998 PPP Gandalf FZA Compression Protocol
RFC 2385 BGP Session Protection via TCP MD5
RFC 2439 BGP Route Flap Damping
RFC 2842 Capability Advertisement with BGP-4
RFC 2858 BGP-4 Multi-Protocol Extensions
RFC 2918 Route Refresh Capability
RFC 4271 A Border Gateway Protocol 4 (BGP-4)
RFC 4272 BGP Security Vulnerabilities Analysis
RFC 4274 BGP-4 Protocol Analysis
RFC 4275 BGP-4 MIB Implementation Survey
RFC 4276 BGP-4 Implementation Report
RFC 4277 Experience with the BGP-4 Protocol
RFC 4360 BGP Extended Communities Attribute
RFC 4451 BGP MULTI_EXIT_DISC (MED) Considerations
RFC 4456 BGP Route Reflection: An Alternative to Full Mesh Internal BGP (IBGP)
RFC 4486 Subcodes for BGP Cease Notification Message
RFC 4724 Graceful Restart Mechanism for BGP
RFC 4760 Multiprotocol Extensions for BGP-4
RFC 4893 BGP Support for Four-octet AS Number Space
RFC 5065 Autonomous System Confederations for BGP
RFC 5291 Outbound Route Filtering Capability for BGP-4
RFC 5292 Address-Prefix-Based Outbound Route Filter for BGP-4
RFC 5398 Autonomous System (AS) Number Reservation for Documentation Use
RFC 5883 BFD for Multihop Paths

IPv6

RFC 1350 TFTP
RFC 1886 DNS Extension for IPv6
RFC 1887 IPv6 Unicast Address Allocation Architecture
RFC 1981 IPv6 Path MTU Discovery
RFC 2080 RIPng for IPv6
RFC 2292 Advanced Sockets API for IPv6
RFC 2373 IPv6 Addressing Architecture
RFC 2375 IPv6 Multicast Address Assignments
RFC 2460 IPv6 Specification
RFC 2461 IPv6 Neighbor Discovery
RFC 2462 IPv6 Stateless Address Auto-configuration
RFC 2463 ICMPv6
RFC 2464 Transmission of IPv6 over Ethernet Networks
RFC 2472 IP Version 6 over PPP
RFC 2473 Generic Packet Tunneling in IPv6
RFC 2475 IPv6 DiffServ Architecture
RFC 2529 Transmission of IPv6 Packets over IPv4
RFC 2545 Use of MP-BGP-4 for IPv6
RFC 2553 Basic Socket Interface Extensions for IPv6
RFC 2710 Multicast Listener Discovery (MLD) for IPv6
RFC 2711 IPv6 Router Alert Option
RFC 2740 OSPFv3 for IPv6
RFC 2893 Transition Mechanisms for IPv6 Hosts and Routers
RFC 2894 Router Renumbering for IPv6
RFC 2925 Definitions of Managed Objects for Remote Ping, Traceroute, and Lookup Operations (Ping only)
RFC 3056 Connection of IPv6 Domains via IPv4 Clouds
RFC 3162 RADIUS and IPv6
RFC 3306 Unicast-Prefix-based IPv6 Multicast Addresses (v2 models only)
RFC 3307 IPv6 Multicast Address Allocation
RFC 3315 DHCPv6 (client and relay)
RFC 3363 DNS support
RFC 3484 Default Address Selection for IPv6
RFC 3493 Basic Socket Interface Extensions for IPv6

Technical Specifications

Denial of service protection
CPU DoS Protection
Rate Limiting by ACLs

Device management
RFC 1155 Structure and Mgmt Information (SMIv1)
RFC 1157 SNMPv1/v2c
RFC 1305 NTPv3
RFC 1901 (Community based SNMPv2)
RFC 1901-1907 SNMPv2c, SMIv2 and Revised MIB-II
RFC 1902 (SNMPv2)
RFC 1908 (SNMP v1/2 Coexistence)
RFC 1945 Hypertext Transfer Protocol -- HTTP/1.0
RFC 2068 Hypertext Transfer Protocol -- HTTP/1.1
RFC 2271 Framework
RFC 2452 MIB for TCP6
RFC 2454 MIB for UDP6
RFC 2573 (SNMPv3 Applications)
RFC 2576 (Coexistence between SNMP V1, V2, V3)
RFC 2578-2580 SMIv2
RFC 2579 (SMIv2 Text Conventions)
RFC 2580 (SMIv2 Conformance)
RFC 2819 (RMON groups Alarm, Event, History and Statistics only)
RFC 2819 RMON
RFC 3410 (Management Framework)
RFC 3416 (SNMP Protocol Operations v2)
RFC 3417 (SNMP Transport Mappings)
Multiple Configuration Files
Multiple Software Images
SNMP v3 and RMON RFC support
SSHv1/SSHv2 Secure Shell
TACACS/TACACS+

General protocols
IEEE 802.1ad Q-in-Q
IEEE 802.1ag Service Layer OAM
IEEE 802.1ah Provider Backbone Bridges
IEEE 802.1AX-2008 Link Aggregation
IEEE 802.1D MAC Bridges
IEEE 802.1p Priority
IEEE 802.1Q (GVRP)
IEEE 802.1Q VLANs
IEEE 802.1s (MSTP)
IEEE 802.1s Multiple Spanning Trees
IEEE 802.1v VLAN classification by Protocol and Port
IEEE 802.1w Rapid Reconfiguration of Spanning Tree
IEEE 802.1X PAE
IEEE 802.3 Type 10BASE-T
IEEE 802.3ab 1000BASE-T

(v2 models only)
RFC 3513 IPv6 Addressing Architecture
RFC 3542 Advanced Sockets API for IPv6
RFC 3587 IPv6 Global Unicast Address Format
RFC 3596 DNS Extension for IPv6
RFC 3646 DNS Configuration options for Dynamic Host Configuration Protocol for IPv6
RFC 3736 Stateless Dynamic Host Configuration Protocol (DHCP) Service for IPv6
RFC 3810 MLDv2 (host joins only)
RFC 3810 MLDv2 for IPv6
RFC 3810 Multicast Listener Discovery Version 2 (MLDv2) for IPv6
RFC 3956 Embedding the Rendezvous Point (RP) Address in an IPv6 Multicast Address
RFC 4001 Textual Conventions for Internet Network Addresses
RFC 4007 IPv6 Scoped Address Architecture
RFC 4022 MIB for TCP
RFC 4113 MIB for UDP
RFC 4251 SSHv6 Architecture
RFC 4252 SSHv6 Authentication
RFC 4252 SSHv6 Transport Layer
RFC 4253 SSHv6 Transport Layer
RFC 4254 SSHv6 Connection
RFC 4291 IP Version 6 Addressing Architecture
RFC 4293 MIB for IP
RFC 4419 Key Exchange for SSH
RFC 4443 ICMPv6
RFC 4541 IGMP & MLD Snooping Switch
RFC 4552 Authentication/Confidentiality for OSPFv3
RFC 4798 Connecting IPv6 Islands over IPv4 MPLS Using IPv6 Provider Edge Routers (6PE)
RFC 4861 IPv6 Neighbor Discovery
RFC 4862 IPv6 Stateless Address Auto-configuration
RFC 4940 IANA Considerations for OSPF
RFC 5072 IP Version 6 over PPP
RFC 5095 Deprecation of Type 0 Routing Headers in IPv6
RFC 5340 OSPF for IPv6
RFC 5340 OSPFv3 for IPv6
RFC 5722 Handling of Overlapping IPv6 Fragments
RFC 5881 BFD for IPv4 and IPv6 (Single Hop)

MIBs
IEEE 8021-PAE-MIB
IEEE 8023-LAG-MIB
RFC 1156 (TCP/IP MIB)
RFC 1212 Concise MIB Definitions
RFC 1213 MIB II

Technical Specifications

IEEE 802.3ac (VLAN Tagging Extension)
IEEE 802.3ad Link Aggregation (LAG)
IEEE 802.3ad Link Aggregation Control Protocol (LACP)
IEEE 802.3ae 10-Gigabit Ethernet
IEEE 802.3ag Ethernet OAM
IEEE 802.3ah Ethernet in First Mile over Point to Point Fiber - EFMF
IEEE 802.3i 10BASE-T
IEEE 802.3u 100BASE-X
IEEE 802.3x Flow Control
IEEE 802.3z 1000BASE-X
RFC 768 UDP
RFC 783 TFTP Protocol (revision 2)
RFC 791 IP
RFC 792 ICMP
RFC 793 TCP
RFC 826 ARP
RFC 854 TELNET
RFC 855 Telnet Option Specification
RFC 856 TELNET
RFC 857 Telnet Echo Option
RFC 858 Telnet Suppress Go Ahead Option
RFC 894 IP over Ethernet
RFC 896 Congestion Control in IP/TCP Internetworks
RFC 906 TFTP Bootstrap
RFC 925 Multi-LAN Address Resolution
RFC 950 Internet Standard Subnetting Procedure
RFC 951 BOOTP
RFC 959 File Transfer Protocol (FTP)
RFC 1006 ISO transport services on top of the TCP: Version 3
RFC 1027 Proxy ARP
RFC 1034 Domain Concepts and Facilities
RFC 1035 Domain Implementation and Specification
RFC 1042 IP Datagrams
RFC 1058 RIPv1
RFC 1071 Computing the Internet Checksum
RFC 1091 Telnet Terminal-Type Option
RFC 1093 NSFNET routing architecture
RFC 1122 Host Requirements
RFC 1141 Incremental updating of the Internet checksum
RFC 1142 OSI IS-IS Intra-domain Routing Protocol
RFC 1144 Compressing TCP/IP headers for low-speed serial links
RFC 1191 Path MTU discovery
RFC 1195 OSI ISIS for IP and Dual Environments
RFC 1213 Management Information Base for Network Management of TCP/IP-based internets
RFC 1256 ICMP Router Discovery Protocol (IRDP)

RFC 1286 Bridge MIB
RFC 1493 Bridge MIB
RFC 1573 SNMP MIB II
RFC 1643 Ethernet MIB
RFC 1650 Ethernet-Like MIB
RFC 1657 BGP-4 MIB
RFC 1724 RIPv2 MIB
RFC 1757 Remote Network Monitoring MIB
RFC 1850 OSPFv2 MIB
RFC 1907 SNMPv2 MIB
RFC 2011 SNMPv2 MIB for IP
RFC 2012 SNMPv2 MIB for TCP
RFC 2013 SNMPv2 MIB for UDP
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RFC 1552 The PPP Internetworking Packet Exchange Control Protocol (IPXCP)
RFC 1577 Classical IP and ARP over ATM
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RFC 1624 Incremental Internet Checksum
RFC 1631 NAT
RFC 1638 PPP Bridging Control Protocol (BCP)
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RFC 4216 MPLS Inter-Autonomous System (AS) Traffic Engineering (TE) Requirements
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RFC 4448 Encapsulation Methods for Transport of Ethernet over MPLS Networks
RFC 4576 Using a Link State Advertisement (LSA) Options Bit to Prevent Looping in BGP/MPLS
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RFC 1944 Benchmarking Methodology for Network
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RFC 1945 Hypertext Transfer Protocol –- HTTP/1.0
RFC 1973 PPP in Frame Relay
RFC 1974 PPP Stac LZS Compression Protocol
RFC 1981 Path MTU Discovery for IP version 6
RFC 1990 The PPP Multilink Protocol (MP)
RFC 1994 PPP Challenge Handshake Authentication
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RFC 2082 RIP-2 MD5 Authentication
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RFC 5443 LDP IGP Synchronization
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RFC 1905 SNMPv2 Protocol Operations
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RFC 2544 Benchmarking Methodology for Network Interconnect Devices
RFC 2581 TCP Congestion Control
RFC 2615 PPP over SONET/SDH (Synchronous Optical Network/Synchronous Digital Hierarchy)
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RFC 2617 HTTP Authentication: Basic and Digest Access Authentication
RFC 2622 Routing Policy Specification Language (RPSL)
RFC 2644 Directed Broadcast Control
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RFC 2663 NAT Terminology and Considerations
RFC 2684 Multiprotocol Encapsulation over ATM Adaptation Layer 5
RFC 2694 DNS extensions to Network Address Translators (DNS_ALG)
RFC 2702 Requirements for Traffic Engineering Over MPLS
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RFC 2747 RSVP Cryptographic Authentication
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RFC 2765 Stateless IP/ICMP Translation Algorithm (SIIT)
RFC 2766 Network Address Translation - Protocol Translation (NAT-PT)
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RFC 2784 Generic Routing Encapsulation (GRE)
RFC 2787 Definitions of Managed Objects for VRRP
RFC 2833 RTP Payload for DTMF Digits, Telephony Tones and Telephony Signals
RFC 2856 Textual Conventions for Additional High Capacity Data Types
RFC 2865 Remote Authentication Dial In User Service (RADIUS)
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ANSI/TIA-1057 LLDP Media Endpoint Discovery (LLDP-MED)
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RFC 1245 OSPF protocol analysis
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RFC 2961 RSVP Refresh Overhead Reduction Extensions
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RFC 3214 LSP Modification Using CR-LDP
RFC 3215 LDP State Machine
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RFC 3268 Advanced Encryption Standard (AES) Ciphersuites for Transport Layer Security (TLS)
RFC 3272 Overview and Principles of Internet Traffic Engineering
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RFC 3279 Algorithms and Identifiers for the Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile
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RFC 4577 OSPF as the Provider/Customer Edge Protocol for BGP/MPLS IP Virtual Private Networks (VPNs)
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RFC 3567 Intermediate System to Intermediate System (IS-IS) Cryptographic Authentication
RFC 3590 Source Address Selection for the Multicast Listener Discovery (MLD) Protocol
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RFC 3954 Cisco Systems NetFlow Services Export Version 9
RFC 4213 Basic IPv6 Transition Mechanisms
RFC 4884 Extended ICMP to Support Multi-Part Messages
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RFC 5286 Basic Specification for IP Fast Reroute: Loop-Free Alternates
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RFC 5882 Generic Application of BFD

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Definition of the EF PHB (Expedited Forwarding Per-Hop Behavior)
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RFC 3662 A Lower Effort Per-Domain Behavior (PDB) for Differentiated Services
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RFC 1492 TACACS+
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RFC 2409 The Internet Key Exchange (IKE)
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RFC 2716 PPP EAP TLS Authentication Protocol
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RFC 3576 Dynamic Authorization Extensions to RADIUS
RFC 3579 RADIUS Support For Extensible Authentication Protocol (EAP)
RFC 3580 IEEE 802.1X Remote Authentication Dial In User Service (RADIUS) Usage Guidelines
RFC 4250 The Secure Shell (SSH) Protocol Assigned Numbers
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RFC 3446 Anycast Rendezvous Point (RP) mechanism using Protocol Independent Multicast (PIM) and Multicast Source Discovery Protocol (MSDP)
RFC 3569 An Overview of Source-Specific Multicast (SSM)
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RFC 3973 PIM Dense Mode
RFC 4601 PIM Sparse Mode
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RFC 4607 Source-Specific Multicast for IP
RFC 4608 Source-Specific Protocol Independent Multicast in 232/8 (PIM SSM)
RFC 4611 Multicast Source Discovery Protocol (MSDP) Deployment Scenarios
RFC 4950 ICMP Extensions for Multiprotocol Label Switching
RFC 5015 Bidirectional Protocol Independent Multicast (BIDIR-PIM)
RFC 5059 Bootstrap Router (BSR) Mechanism for Protocol Independent Multicast (PIM)
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RFC 2404 - HMAC-SHA1-96
RFC 2405 - DES-CBC Cipher algorithm
RFC 2407 - Domain of interpretation
RFC 2547 BGP/MPLS VPNs
RFC 2764 A Framework for IP Based Virtual Private Networks
RFC 2796 BGP Route Reflection - An Alternative to Full Mesh IBGP
RFC 2842 Capabilities Advertisement with BGP-4
RFC 2858 Multiprotocol Extensions for BGP-4
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RFC 2918 Route Refresh Capability for BGP-4
RFC 3107 Carrying Label Information in BGP-4
RFC 4302 - IP Authentication Header (AH)
RFC 4303 - IP Encapsulating Security Payload (ESP)
RFC 4305 - Cryptographic Algorithm Implementation Requirements for ESP and AH

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RFC 2401 IP Security Architecture
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RFC 2409 - The Internet Key Exchange
RFC 2410 - The NULL Encryption Algorithm and its use with IPSec
RFC 2411 IP Security Document Roadmap
RFC 2412 – OAKLEY
RFC 2865 - Remote Authentication Dial In User Service (RADIUS)
RFC 4835 Cryptographic Algorithm Implementation Requirements for Encapsulating Security

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RFC 2865 - Remote Authentication Dial In User Service (RADIUS)
RFC 3748 - Extensible Authentication Protocol (EAP)

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RFC 4109 Algorithms for Internet Key Exchange version 1 (IKEv1)

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RFC 5280 Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile

Accessories

HP HSR6600 Router Series accessories

Transceivers

HP X110 100M SFP LC LH40 Transceiver	JD090A
HP X110 100M SFP LC LH80 Transceiver	JD091A
HP X110 100M SFP LC FX Transceiver	JD102B
HP X110 100M SFP LC LX Transceiver	JD120B
HP X120 622M SFP LC LX 15km Transceiver	JF829A
HP X120 622M SFP LC LH 40km 1310 Transceiver	JF830A
HP X120 622M SFP LC LH 80km 1550 Transceiver	JF831A
HP X125 1G SFP LC LH40 1310nm Transceiver	JD061A
HP X120 1G SFP LC LH40 1550nm Transceiver	JD062A
HP X120 1G SFP LC BX 10-U Transceiver	JD098B
HP X120 1G SFP LC BX 10-D Transceiver	JD099B
HP X120 1G SFP LC LH100 Transceiver	JD103A
HP X120 1G SFP LC SX Transceiver	JD118B
HP X120 1G SFP LC LX Transceiver	JD119B
HP X125 1G SFP LC LH70 Transceiver	JD063B
HP X120 1G SFP RJ45 T Transceiver	JD089B
HP X160 2.5G SFP LC 2km Transceiver	JD084A
HP X160 2.5G SFP LC 15km Transceiver	JD085A
HP X160 2.5G SFP LC 40km Transceiver	JD086A
HP X160 2.5G SFP LC 80km Transceiver	JD087A
HP X135 10G XFP LC ER Transceiver	JD121A
HP X130 10G XFP LC LR Transceiver	JD108B
HP X130 10G XFP LC SR Transceiver	JD117B
HP X130 10G SFP+ LC SR Transceiver	JD092B
HP X130 10G SFP+ LC LR Transceiver	JD094B
HP X130 10G SFP+ LC ER 40km Transceiver	JG234A

Cables

HP X200 V.24 DTE 3m Serial Port Cable	JD519A
HP X200 V.24 DCE 3m Serial Port Cable	JD521A
HP X200 V.35 DTE 3m Serial Port Cable	JD523A
HP X200 V.35 DCE 3m Serial Port Cable	JD525A
HP X200 X.21 DTE 3m Serial Port Cable	JD527A
HP X200 X.21 DCE 3m Serial Port Cable	JD529A
HP X260 RS449 3m DTE Serial Port Cable	JF825A
HP X260 RS449 3m DCE Serial Port Cable	JF826A
HP X260 RS530 3m DTE Serial Port Cable	JF827A
HP X260 RS530 3m DCE Serial Port Cable	JF828A
HP X260 8E1 BNC 75 ohm 3m Router Cable	JD512A
HP X260 E1 RJ45 BNC 75-120 ohm Conversion Router Cable	JD511A

Power Supply

HP 5800 300W AC Power Supply	JC087A
HP 5800 300W DC Power Supply	JC090A

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Fan Tray

HP HSR6602 Router Spare Fan Assembly	JG359A

Router Modules

HP 6600 8-port 10/100Base-T HIM Module	JC575A
HP 6600 4-port Gig-T HIM Module	JC163A
HP 6600 8-port Gig-T HIM Module	JC164A
HP 6600 4-port GbE SFP HIM Module	JC171A
HP 6600 8-port GbE SFP HIM Module	JC174A
HP 6600 1-port 10-GbE XFP HIM Module	JC168A
HP 6600 1-port OC-3/STM-1 (E1/T1) CPOS SFP HIM Module	JC161A
HP 6600 2-port OC-3/STM-1 (E1/T1) CPOS SFP HIM Module	JC162A
HP 6600 2-port OC-3/STM-1 (E3/T3) CPOS SFP HIM Module	JC169A
HP 6600 1-port OC-3/STM-1 (E3/T3) CPOS SFP HIM Module	JC170A
HP 6600 4-port OC-3c/STM-1c or 2-port OC-12c/STM-4c POS SFP HIM Module	JC172A
HP 6600 2-port OC-3c/STM-1c or 1-port OC-12c/STM-4c POS SFP HIM Module	JC173A
HP 6600 1-port OC-3c/STM-1c ATM SFP HIM Module	JC175A
HP 6600 1-port OC-48c/STM-16c POS/CPOS SFP HIM Module	JC494A
HP 6600 2-port OC-3c/STM-1c ATM SFP HIM Module	JC495A
HP 6600 2-port OC-48c/STM-16c RPR SFP HIM Module	JC576A
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HP MSR 8-port T1/Fractional T1 MIM Module	JC159A
HP MSR 8-port T1/CT1/PRI MIM Module	JC160A
HP MSR 4-port Enhanced Sync/Async Serial MIM Module	JD541A
HP MSR 8-port Enhanced Sync/Async Serial MIM Module	JD552A
HP MSR 1-port T3/CT3/FT3 MIM Module	JD628A
HP MSR 1-port FE3/CE3 MIM Module	JD630A
HP MSR 8-port E1/Fractional E1 (75ohm) MIM Module	JF255A
HP 6600 FIP-10 Flexible Interface Platform Router Module	JG357A
HP 6600 FIP-20 Flexible Interface Platform Router Module	JG358A
HP MSR 1-port T3 / CT3 / FT3 HMIM Module	JG435A
HP MSR 1-port E3 / CE3 / FE3 HMIM Module	JG436A

Memory

HP X610 2G VLP DDR3 SDRAM Memory	JG482A

Accessory Product Details

NOTE: Details are not available for all accessories. The following specifications were available at the time of publication.

HP X125 1G SFP LC LH40 1310nm Transceiver (JD061A) A small form-factor pluggable SFP Gigabit LH40 transceiver that provides a full duplex Gigabit solution up to 40km on a single-mode fiber.	**Ports**	1 LC 1000Base-LH port (no IEEE standard exists for 1550 nm optics)	
	Connectivity	Connector type	LC
		Wavelength	1310 nm
	Physical characteristics	Dimensions	2.17(d) x 0.6(w) x 0.46(h) in. (5.51 x 1.52 x 1.17 cm)
		Full configuration weight	0.04 lb. (0.02 kg)
	Electrical characteristics	Power consumption typical	0.8 W
		Power consumption maximum	1.0 W
	Cabling	Cable type: Single-mode fiber optic, complying with ITU-T G.652; Maximum distance: ● 40km distance	
		Fiber type	Single Mode
	Services	Refer to the HP website at www.hp.com/networking/services for details on the service-level descriptions and product numbers. For details about services and response times in your area, please contact your local HP sales office.	

HP X120 1G SFP LC LH40 1550nm Transceiver (JD062A) A small form-factor pluggable (SFP) Gigabit LH40 transceiver that provides a full-duplex Gigabit solution up to 40 km on a single mode fiber.	**Ports**	1 LC 1000BASE-LH port (no IEEE standard exists for 1550 nm optics)	
	Connectivity	Connector type	LC
		Wavelength	1550 nm
	Physical characteristics	Dimensions	2.17(d) x 0.6(w) x 0.46(h) in. (5.51 x 1.52 x 1.17 cm)
		Full configuration weight	0.04 lb. (0.02 kg)
	Electrical characteristics	Power consumption typical	0.8 W
		Power consumption maximum	1.0 W
	Cabling	Cable type: Single-mode fiber optic, complying with ITU-T G.652; Maximum distance: ● 40km distance	
		Fiber type	Single Mode
	Services	Refer to the HP website at www.hp.com/networking/services for details on the service-level descriptions and product numbers. For details about services and response times in your area, please contact your local HP sales office.	

Accessory Product Details

HP X120 1G SFP LC BX 10-U Transceiver (JD098B)

A small form-factor pluggable (SFP) Gigabit LX-BX10-U transceiver that provides a full duplex Gigabit solution up to 10km on a single mode cable.

Ports	1 LC 1000BASE-BX10 port (IEEE 802.3ah Type 1000BASE-BX10-U); Duplex: full only	
Connectivity	**Connector type**	LC
Physical characteristics	**Dimensions**	2.17(d) x 0.6(w) x 0.46(h) in. (5.51 x 1.52 x 1.17 cm)
	Full configuration weight	0.04 lb. (0.02 kg)
Electrical characteristics	**Power consumption typical**	0.8 W
	Power consumption maximum	1.0 W
Cabling	Maximum distance: • 10km	
	Fiber type	Single Mode
Notes	TX 1310nm RX 1490nm	
Services	Refer to the HP website at: www.hp.com/networking/services for details on the service-level descriptions and product numbers. For details about services and response times in your area, please contact your local HP sales office.	

HP X120 1G SFP LC BX 10-D Transceiver (JD099B)

A small form-factor pluggable (SFP) Gigabit LX-BX10-D transceiver that provides a full duplex Gigabit solution up to 10km on a single mode cable.

Ports	1 LC 1000BASE-BX10 port (IEEE 802.3ah Type 1000BASE-BX10-D); Duplex: full only	
Connectivity	**Connector type**	LC
Physical characteristics	**Dimensions**	2.17(d) x 0.6(w) x 0.46(h) in. (5.51 x 1.52 x 1.17 cm)
	Full configuration weight	0.04 lb. (0.02 kg)
Electrical characteristics	**Power consumption typical**	0.8 W
	Power consumption maximum	1.0 W
Cabling	Maximum distance: • Up to 10km	
	Fiber type	Single Mode
Notes	TX 1490nm RX 1310nm	
Services	Refer to the HP website at www.hp.com/networking/services for details on the service-level descriptions and product numbers. For details about services and response times in your area, please contact your local HP sales office.	

Accessory Product Details

HP X120 1G SFP LC LH100 Transceiver (JD103A) A small form factor pluggable (SFP) Gigabit LH100 transceiver that provides a full-duplex Gigabit solution up to 100km on a single mode fiber.	**Ports**	1 LC 1000BASE-LH port (no IEEE standard exists for 1550 nm optics)	
	Connectivity	**Connector type**	LC
		Wavelength	1550 nm
	Electrical characteristics	**Power consumption typical**	0.8 W
		Power consumption maximum	1.0 W
	Cabling	Cable type: Single-mode fiber optic, complying with ITU-T G.652; Maximum distance: • Up to 100km	
		Fiber type	Single Mode
	Services	Refer to the HP website at www.hp.com/networking/services for details on the service-level descriptions and product numbers. For details about services and response times in your area, please contact your local HP sales office.	

HP X120 1G SFP LC SX Transceiver (JD118B) A small form-factor pluggable (SFP) Gigabit SX transceiver that provides a full-duplex Gigabit solution up to 550m on a Multimode fiber.	**Ports**	1 LC 1000BASE-SX port	
	Connectivity	**Connector type**	LC
		Wavelength	850 nm
	Physical characteristics	**Dimensions**	2.17(d) x 0.6(w) x 0.46(h) in. (5.51 x 1.52 x 1.17 cm)
		Full configuration weight	0.04 lb. (0.02 kg)
	Electrical characteristics	**Power consumption typical**	0.8 W
		Power consumption maximum	1.0 W
	Cabling	Maximum distance: • FDDI Grade distance = 220m • OM1 = 275m • OM2 = 500m • OM3 = Not Specified by standard	
		Cable length	up to 550m
		Fiber type	Multi Mode
	Services	Refer to the HP website at www.hp.com/networking/services for details on the service-level descriptions and product numbers. For details about services and response times in your area, please contact your local HP sales office.	

Accessory Product Details

HP X120 1G SFP LC LX Transceiver (JD119B) A small form-factor pluggable (SFP) Gigabig LX transceiver that provides a full duplex Gigabit solution up to 550m on MMF or 10Km on SMF	**Ports**	1 SFP 1000BASE-LX port (IEEE 802.3z Type 1000BASE-LX)	
	Connectivity	Connector type	LC
		Wavelength	1300 nm
	Physical characteristics	Dimensions	2.17(d) x 0.6(w) x 0.46(h) in. (5.51 x 1.52 x 1.17 cm)
		Full configuration weight	0.04 lb. (0.02 kg)
	Electrical characteristics	Power consumption typical	0.8 W
		Power consumption maximum	1.0 W
	Cabling	Cable type: Either single mode or multimode; Maximum distance: • 550m for Multimode • 10km for Singlemode	
		Fiber type	Both
	Services	Refer to the HP website at www.hp.com/networking/services for details on the service-level descriptions and product numbers. For details about services and response times in your area, please contact your local HP sales office.	

HP X125 1G SFP LC LH70 Transceiver (JD063B) A small form-factor pluggable (SFP) Gigabit LH70 transceiver that provides a full-duplex Gigabit solution up to 70km on a single-mode fiber.	**Ports**	1 LC 1000BASE-LH port (no IEEE standard exists for 1550 nm optics)	
	Connectivity	Connector type	LC
		Wavelength	1550 nm
	Physical characteristics	Dimensions	2.17(d) x 0.6(w) x 0.46(h) in. (5.51 x 1.52 x 1.17 cm)
		Full configuration weight	0.04 lb. (0.02 kg)
	Electrical characteristics	Power consumption typical	0.8 W
		Power consumption maximum	1.0 W
	Cabling	Cable type: Single-mode fiber optic, complying with ITU-T G.652; Maximum distance: • 70km	
		Fiber type	Single Mode
	Services	Refer to the HP website at www.hp.com/networking/services for details on the service-level descriptions and product numbers. For details about services and response times in your area, please contact your local HP sales office.	

Accessory Product Details

HP X120 1G SFP RJ45 T Transceiver (JD089B) A small form factor pluggable (SFP) Gigabit 1000Base-T transceiver that provides a full duplex Gigabit solution up to 100m on a Cat-5+ cable.	**Ports**		1 RJ-45 1000BASE-T port (IEEE 802.3ab Type 1000BASE-T)
	Connectivity	**Connector type**	RJ-45
	Physical characteristics	**Dimensions**	2.71(d) x 0.54(w) x 0.55(h) in. (6.88 x 1.37 x 1.4 cm)
		Full configuration weight	0.07 lb. (0.03 kg)
	Electrical characteristics	**Power consumption typical**	0.8 W
		Power consumption maximum	1.0 W
	Cabling		Cable type: 1000BASE-T: Category 5 (5E or better recommended), 100 Ù differential 4-pair unshielded twisted pair (UTP) or shielded twisted pair (STP) balanced, complying with IEEE 802.3ab 1000BASE-T; Maximum distance: • 100m
	Services		Refer to the HP website at www.hp.com/networking/services for details on the service-level descriptions and product numbers. For details about services and response times in your area, please contact your local HP sales office.

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